AVIATION

JULY 23, 1923 Issued Weekly PRICE 10 CENTS

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VOLUME XV

NUMBER 4

SPECIAL FEATURES

FREE BALLOON HAZARDS OVER WATER
THE EMPLOYMENT OF HELIUM IN AIRSHIPS
SIMPLE CHART FOR CHOOSING A WING SURFACE
ANNUAL MEETING OF AERO CHAMBER OF COMMERCE

THE GARDNER, MOFFAT CO., INC.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK

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CONTENTS

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AVIATION

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Vol XV July 23, 1923 No 4

Greater Safety for Free Balloons

THE lamentable loss in Lake Erie of Lieuts. L. J. Roth and T. B. Null, pilot and aide respectively of one of the Navy entries in the National Balloon Race, calls attention to the fact that there still remains much to be done to endow free balloons with a reasonable amount of safety when operating over large bodies of water. It is hoped that the loss of these gallant men will be a spur to introduce on free balloons such safety measures as will reduce the hazard of foundering to a minimum.

An article dealing with this subject which appears in this issue examines the question from many interesting angles. Its author is well qualified to speak on this subject, for he is a balloonist of long experience who engaged in experimental and development work on free and kite balloons while he was serving his country in the Naval Air Service.

Following this recent balloon fatality, the question has again been asked why "drifting aircraft" should be used for training purposes in the Air Service rather than "driven aircraft." The answer to this is simple.

The air cannot be conquered by scientific tests alone. For training purposes the free balloon is unique, for it is free from all noises, sudden movements and mechanical complications that otherwise interfere with attempts to give practical instruction in the air. In the study of aerostatics the free balloon is the foundation of all lighter-than-air craft. In the study of navigation and meteorology it is fundamental to heavier than air craft as well.

Further than this, the intensive demands of a balloon race on both mental and physical qualities make valuable training not only for pilots in general, but for anyone who values a [illegible] combination of these qualities.

Lieutenants Roth and Null have paid the supreme price in [illegible] efforts to win. Their bravery was no less great nor given [illegible] a less good purpose than had it been given in war. It may be justly said that a country is only as big [illegible] sports. The competitive spirit of fair play in true [illegible] the same spirit that makes great national character, [illegible] as well as in war.

Use of Helium in Airships

EVER since helium was produced in quantities as the result of the research work of American chemists, the question has been asked whether this new lifting gas was not [illegible] expensive to permit of current employment in commercial airship operation.

[illegible] Crocco, the distinguished Italian airship engineer and one of the creators of the Italian semi-rigid type, in discussing this question in the present issue, concludes that the substitution of helium for hydrogen is not only commercially possible, but even economically profitable.

Performance vs. Equipment

DURING the past year the United States has captured practically all the important world's airplane records. This is convincing proof that our aeronautical development is progressing satisfactorily when considered from the sole viewpoint of performance. This viewpoint may unfortunately create in the public mind a feeling of security regarding our aeronautical situation which is not warranted by facts.

Just because we hold the major world's airplane records, we should not draw the conclusion that these records give us any special security in the air. Only a well equipped and well trained air force can with justification give us that security.

This country has learned little from its previous war experiences. Before trouble is immediately ahead the public feels that expenditures for war preparations are unnecessary, and that they should be kept down to a minimum. But as soon as our national honor is involved, everyone expects equipment to come into being overnight for use against the enemy. Then, orders are given right and left for huge quantities of the needed supplies, and the industry is expected to drop its normal work and switch over to the production of military and naval supplies on instant notice. The inevitable result happens. The war equipment, hurriedly produced, is usually not as satisfactory as expected, great expense is incurred and owing to unavoidable delays much equipment is delivered too late to be of service.

The above procedure applies to aircraft even more than to any other kind of military or naval equipment. Capital ships are of necessity built before wars break out. Major warships cannot be built in time to be of service once war has been declared. The same applies to war aircraft. To be of the greatest value, our air force must be ready on the day hostilities start to strike first. It is generally conceded that the belligerent who gains mastery of the air at the outset will have a tremendous advantage in the next war.

Now, what is the situation with respect to aircraft? We have no pursuit planes on order or in service that are comparable in performance with our record breaking ships. We have some bombers and some Navy spotting and torpedo planes under order—but what use are these types of aircraft without a strong pursuit aviation? Experts will say that it is of little value against an enemy force of thoroughly up to date pursuit planes.

We should not let our pride in our record breaking performances becloud the fact that we are practically defenseless in the air against an enemy adequately equipped with aircraft. As the Assistant Secretary of War recently said, "If war were declared tomorrow, what would we do for aircraft?"

Annual Meeting of Aero Chamber of Commerce

Report of Operations for Current Year Shows Encouraging Outlook in All Aeronautical Activities

The annual meeting of the members of the Aeronautical Chamber of Commerce of America, Inc, was held on Thursday, July 12, in the Executive Offices, 501 Fifth Avenue, New York City Eighty-seven members were present, either in person or by proxy, this being a larger attendance than at either the organization or the first annual meeting one year ago

Aside from the practical evidence afforded by the attendance, much interest was manifest in the Report of Operations for the past year and in plans for the future The fact that the Chamber now has 216 members, a growth of 25 per cent, in twelve months, was received with satisfaction and the unanimous conviction was expressed that the work which has been carried on should be maintained along the lines indicated by the report, and, if possible, expanded as the industry grows.

New Board of Governors

The following were elected to serve on the Board of Governors for the ensuing year: Samuel S Bradley, New York; Charles H Colvin, Brooklyn, N Y, Donald Douglas, Santa Monica, Calif, Sherman M Fairchild, N Y., Allan Jackson, Chicago, Ill, E A Johnson, Dayton, Ohio, John M Larsen, N Y, Grover C Loening, N Y; F B Rentschler, Paterson, N. J; Frank H Russell, Garden City, N Y, Lawrence B. Sperry, Farmingdale, L. I, B D Thomas, Ithaca, N Y, I M Uppercu, Keyport, N J; Jesse G Vincent, Detroit, Mich; W C Young, Akron, Ohio

Mr Colvin is General Manager of the Pioneer Instrument Co, Mr Douglas, President The Douglas Co, Mr Fairchild, President The Fairchild Aerial Camera Corp, Mr Johnson, Johnson Airplane & Supply Co, Mr Jackson, Vice President Standard Oil Co (Indiana), Mr Larsen, President J L Aircraft Corp; Mr Loening, President Loening Aeronautical Engr Corp, Mr Rentschler, President Wright Aeronautical Corp, Mr Russell, Vice President Curtiss Aeroplane & Motor Corp, Mr Bradley, General Manager Manufacturers Aircraft Association, Mr Sperry, President Lawrence Sperry Aircraft Corp, Mr Thomas, Chief Engr Thomas-Morse Aircraft Corp, Mr Uppercu, President Aeromarine Plane & Motor Co. and Chairman of the Board Aeromarine Airways Corp, Mr Vincent, Vice President Packard Motor Car Co, Mr Young, Aeronautics Manager, Goodyear Tire & Rubber Co

Immediately following adjournment, the new Board of Governors met and elected the following officers President, Frank H. Russell, First Vice President, Allan Jackson, Second Vice President, S M Fairchild, Third Vice President, Donald Douglas, Treasurer, Charles H Colvin, General Manager and Asst. Treasurer, S S Bradley, Secretary, Luther K. Bell, Assistant Secretary, Owen A. Shannon

Report of Operations

The Report of Operations, as presented by the Secretary, is too long for reproduction in this bulletin, but the following are extracts covering more important phases of the Chamber's activity

"The Aeronautical Chamber of Commerce was organized eighteen months ago to coordinate and concentrate by all legitimate means the strength and counsel of the industry in encouraging the use of aircraft Considerable progress has been made The industry as a whole is upon a sounder basis than it was at the last annual meeting and public interest in aviation, both as a means of national defense and as a useful element in commerce and industry, has greatly increased.

Growth in Membership—Growth and interest have been reflected in the consistent expansion in the membership of the Chamber Whereas, on July 11, 1922, there were 175 members (19 in Class A, 39 in Class B and 117 in Class C), there are now 216 (20 in Class A, 59 in Class B and 137 in Class C) a net increase of forty-one members or more than twenty-five (25%) per cent

Our Outstanding Problem—The outstanding problem confronting American aviation is how to maintain the aircraft industry and at the same time create a commercial market. The various Government Departments being at present not only the principal users of aircraft but also a potent means of educating the public, much of our activity has been in connection with maintaining liaison with the Air Service War Department, Bureau of Aeronautics, Navy Department, Air Mail, Post Office Department, Bureau of Foreign and Domestic Commerce, Bureau of the Census and Bureau of Standards, Commerce Department Bureau of Entomology and the Forest Patrol of the Department of Agriculture, the United States Tariff Commission, and the National Advisory Committee for Aeronautics

Frank H Russell, newly elected President, Board of Governors, Aeronautical Chamber of Commerce

Contact with War and Navy Departments—Our contact with the War and Navy Departments is especially interesting in view of the international situation, applied specifically to possible effects on the American aircraft Industry In the Aircraft Year Book for 1923 will be found a comprehensive review of world aeronautics. It is seen that the major European nations, recognizing aircraft as the controlling factor in offense or defense, are on the verge of another period of competition in armament.

The United States Government is alert to this situation and following a policy which has been many times before the President and the Cabinet, the War and Navy Departments are engaged in studying and indexing the various "key" industries, one of which, of course, is aircraft The major part of this work is being done by the Assistant Secretary of War and it is the privilege of the Chamber to assist in making an inventory of aviation and to suggest the best means for working out its future utilization

Helping the Gypsy Flier—The failure to pass the Civil Aeronautics Act of 1923, discussed later in this report, early in the year required consideration of the manner in which surplus flying equipment was being sold by the War and Navy Departments On April 23, following a series of accidents to itinerant fliers, the Chamber took up and worked out with the War and Navy Departments a plan whereby all possible precautions would be followed in the sale of surplus equipment and that, immediately upon sale, the names of the purchasers would be forwarded to the Chamber This is working out satisfactorily. The Chamber is receiving such reports regularly and immediately on receipt the purchaser is communicated with and thus given the benefit of contact with the responsible and established elements of the industry The imperative need for safety is pointed out, information supplied and patriotism and sound sense appealed to. Results thus far obtained indicate that this means of cooperation between the Government, the organized industry and the widely scattered purchasers of aircraft has had very salutary results in the absence of any form of civil air law

The Air Mail

The Air Mail—Through our aircraft constructors and the manufacturers of special equipment for night flying, as well as direct through Postmaster General New and Second Assistant Henderson, we are in intimate contact with the Air Mail. Following suggestions that the Air Mail, being literally a commercial laboratory, great good will follow, should opportunity be given the industry to compete in the development of specialized designs of mail aircraft, the Department called for such equipment and it is understood that the competition will be continued upon a larger scale Following foreign criticism of the Air Mail, the Chamber requested one of its engineering members to make a constructive survey, with especial reference to use of equipment, efficiency and the night flying development, and this survey is being made with the cooperation of Department officials

Department of Commerce—Our work with the Department of Commerce has centered upon the Automotive Division, Bureau of Foreign and Domestic Commerce Through this division we have been in frequent communication with Secretary Hoover We have arranged with the division to obtain air information from abroad and as an integral part of the Department's 'Foreign Trade Manual,' a section of data and questions devoted to the American Aircraft Industry was prepared by the Chamber For the Secretary we also prepared a survey which is published in the New Year Book The Chamber is collaborating with the Bureau of Standards and the Society of Automotive Engineers in preliminary work on aircraft standardization For the Bureau of the Census a report was compiled covering the various phases of aircraft activity in the United States.

Department of Agriculture—Through the War Department and various members we are utilizing the experiments which the Department of Agriculture is making in employing aircraft to exterminate insect pests and plant diseases A profitable field for aircraft sales is opening up and the Chamber is communicating to this end with the various state agricultural and forestry boards

An important part of our relations with the foregoing has to do with publicity We have been frequently called upon, or opportunity has been presented, to be of service in disseminating information which, though related to the Government departments, is primarily concerned with commercial aeronautics

Tariff and Air Law

Tariff Data—Another indication of the responsibilities of the trade association or chamber was the request which the United States Tariff Commission made for data on the industry The information which we are collating is for use in interpreting existing tariff laws and is thus seen to be of considerable importance.

Air Law—A distinct phase of our work has concerned Air Law The progress of the Winslow Bill was related fully in our annual report as of Jan. 1 On Jan 8, Representative Winslow introduced his bill under the name of 'The Civil Aeronautics Act of 1923' The Department of Commerce found the bill entirely satisfactory, as apparently did the War, Navy and Post Office Departments. The Chamber of Commerce of the United States, at our request, on Jan. 25, circularized its entire membership and thereby greatly added to the support of the measure. Similar work was done by the American Defense Society The National Aeronautic Association, through its legislative committee, cooperated with us and, by means of letters and personal interviews, presented the case for air law in a forceful and effective manner The Chamber as you know, many times requested its members to work locally for the measure and this was done. It also was in frequent touch with state and municipal chambers of commerce throughout the United States. Yet, despite this impressive appeal, the House Interstate and Foreign Commerce Committee could not be prevailed upon to hold hearings and Congress adjourned without the desired legislation having been enacted. Efforts are being continued to push this law again when Congress convenes in the Fall

Chamber of Commerce of United States—Through our affiliation with the United States Chamber of Commerce we have been enabled to better reach the public ear At the request of the National Chamber's Department of Transportation and Communication we prepared a series of reports on American aviation for submission to the meeting of the International Chambee of Commerce which was held in Rome last March At this meeting resolutions were adopted strongly appealing for support of civil aviation. Several months later, at the annual meeting of the National Chamber in New York, participated in by representatives of the aircraft industry, air resolutions also were adopted At the request of the Department on Referenda of the National Chamber, we have prepared suggestions for a nation-wide referendum on American aviation, its value and needs.

Local Chambers of Commerce, Banks and Credit Agencies—Closely allied to our relationship with the National Chamber is our liaison with state or municipal Chambers of Commerce We are in communication with fifty or more cities, most of them having designated aviation committees (some at our request) This contact is becoming increasingly valuable, especially in relation to the work of our Air Terminal Committee and our efforts, in cooperation with the War and Navy Departments, to raise the status of the Gypsy flier One of our more recent contacts was with Mayor Dever of Chicago, whom we met in conference with Mr Jackson, one of our Governors.

St. Louis Air Races

St Louis Air Races—The situation with regard to the National Air Races in St. Louis is satisfactory and we are hopeful, despite the late start which was made, that the events will be commensurate with the hopes that have been raised Officers of the Chamber have been in conference with the responsible men in St Louis who are sponsoring the financial side of the enterprise The St. Louis Aeronautic Corporation has been formed, with B F. Bush, Chairman of the Board of the Missouri Pacific Railway as Director General, and Arthur B Birge as General Manager Upon invitation of both Messrs Bush and Birge the Aeronautical Chamber of Commerce is cooperating toward making the meet a success.

1923 Year Book—Work in connection with the 1923 Year Book would appear to be self-evident. With the exception of the Technical Chapter, which was contributed by Dr George W Lewis of the National Advisory Committee for Aeronautics, all the editorial and stenographic work was done by our office. This made very difficult the performance of routine duties.

Bulletin Service—Our bulletin service naturally reflects the growth of our membership and public interest Library, legislative, information, general sales, accessory sales, photo sales and miscellaneous bulletins have gone out in the fiscal year just ended to the approximate number of 52,500 This total includes distribution of information and publicity material, much of which is sent to points in various parts of the world Special interest is believed to attach to our general sales bulletins which indicate aircraft market possibilities in many states in the Union and in such foreign countries as Colombia, Spain, Austria, Cuba, China, Mexico, Japan, Germany and Argentina Additional sales possibilities are seen in the prospective visits to this country of Aviation Missions from Spain and Czecho-Slovakia.

Information—We have been privileged to maintain our information activities, especially those relating to the War, Navy and Post Office Departments, an interesting example of which was the experiment in transporting raw cotton and manufactured fabric in two days more than 1500 miles, which was arranged by the Chamber upon request of the Air Service. We have also continued undiminished the flow of information to public speakers, libraries and colleges and universities.

Air Terminal and Trade Practice Committees—The Chamber's Committees, particularly the Air Terminal and Trade Practice, have gotten under way. For the former the Chamber recently completed a revised list of known aircraft operators in the United States, showing a total of 250 and also compiled with the help of the Airways Section, U. S. Air Service, a classified list of Air Terminals, numbering approximately 2500. The Trade Practice Committee has before it several important questions, a significant one being a protest from an operator in Alaska concerning irresponsible dealers in aircraft supplies.

Conferences—A feature which consumes a very considerable portion of our time, yet which is most welcome and desirable, is the personal use which members and others are making of the Chamber. Correspondence and calls are increasing. Representatives of our corporation members and other aeronautical groups, as well as insurance companies, banks and credit agencies, find contact with our office interesting and profitable and from the viewpoint of the organization these visits may be accepted as indicating substantial and growing interest in and dependence upon the Chamber as the responsible and recognized mouthpiece of the entire industry. Inquiry from banks and trust companies relates not only to the credit and general status of individual elements of the industry and profession, but also to the possibility of utilizing aircraft to meet their need for quickened communication and transportation.

What is to Be Done—As to the future. The aircraft industry has progressed, but its most profitable future lies before it. The thing greatly to be desired is commercial independence. Analysis of the reports from European countries in which aircraft are subsidized, convinces one that the traditional American policy of self support is sound. In so far as it is guided and supported by its members, the policy of the Chamber in the future will be what it has been in the past. The existing industry must needs be preserved so as to enable it to pass naturally, through improved engineering and the acquisition of capital, to the performance of useful tasks for commerce and industry. While military work is desirable and necessary, for reasons of national policy, as well as practical expediency, commercial aviation must be regarded as our ultimate defense in the air, a defense which confers an economic benefit while at the same time it protects those whom it serves. This is the end hoped for by President Harding, as expressed in his letter to the Chamber, and by the War and Navy officials who discern the only real preparedness to be in a sound industry.

It is the privilege as well as the responsibility of the Chamber to express the convictions of its members, to inspire and direct public thought, to correct misapprehension and to stimulate and energize new ideas. The Chamber, however, can be effective in its work only to the degree that it has the benefit of counsel, guidance and support from its members. The future is to a large degree in your hands and the Aeronautical Chamber of Commerce is your voice."

Governors Express Appreciation

The Board of Governors unanimously adopted the following resolution:

Whereas, The report of operations for the last fiscal year as submitted to the members has been considered in detail by the Board of Governors and,

Whereas, it is recognized that such report can only reflect but in a small degree the intent, nature and value of the organization to the industry, and

Whereas, It is recognized that continuation of all of the activities of the Chamber is of great and, perhaps, vital importance to the entire industry. Now, therefore,

Be it resolved, that the work of the organization for the past year be approved and that it be used as a standard for the future and that the retiring Executive Officers and the administrative personnel of the organization be entitled to and are hereby given a vote of thanks and congratulations for the work that has been done.

Among those present at the members' Meeting, in person or by proxy, were:

Aeromarine Airways Corp., Aeromarine Plane & Motor Co., Aircraft Development Corp., Airships Incorporated, H. Barber, Robert H. Baldwin, Luther K. Bell, Archibald Black, R. R. Blythe, Samuel S. Bradley, B. E. Bushnell, John R. Cantley, Charles H. Colvin, S. C. Coon, Curtiss Aeroplane & Motor Corp., Curtiss Exhibition Co., Dayton Wright Company, Richard H. Depew, Fairchild Aerial Camera Corp., Sherman M. Fairchild, Earl N. Findley, Gallaudet Aircraft Corp., John R. Gammeter, Lester D. Gardner, Goodrich Rubber Co., Goodyear Tire & Rubber Co., Charles J. Glidden, Grant Marine Motor Co., Hartford Fire Ins. Co., Hartford Accident & Indemnity Co., Steward Hartshorn Co., Beckwith Havens, William Huskisson, J. L. Aircraft Corp., W. Wallace Kellet, Inc., Herman T. Kraft, John M. Larsen, Lawrance Aero Engine Corp., Charles L. Lawrance, A. R. LeMieux, Loening Aeronautical Engr. Corp., Albert P. Loening, Luftschiffbau-Zeppelin, Charles M. Manly, Manufacturers Aircraft Association, Stephen J. McMahon, Meisel Press Mfg. Co., Mosler Metal Products Co., A. R. Mosler, F. L. Morse, Netherlands Aircraft Mfg. Co., R. B. C. Noordyn, New York Testing Laboratories, Arthur Nutt, Packard Motor Car Co., M. L. Patterson, C. O. Peterson, Stephen J. Phelan, Pioneer Instrument Co., Otto Praeger, J. F. Prince, F. B. Rentschler, Rich Tool Co., Herman B. Ring, J. K. Robinson, Jr., Frank H. Russell, L. R. Seidell, F. J. Shipman, D. A. Shannon, Lawrence Sperry Aircraft Corp., Sperry Gyroscope Co., Lawrence B. Sperry, Standard Oil Co. (Indiana.) The Texas Company, Robert G. Thach, Harry Vissering, Herbert Von Thaden, I. M. Uppercu, Ralph H. Upson, Jesse G. Vincent, Chance Vought Corp., Chance Vought, Wamsutta Mills, Edward P. Warner, O. M. Williams, George S. Wheat, John P. Wood, Wright Aeronautical Corp.

Aircraft Instruments

The Bureau of Standards has prepared a paper describing briefly, without considering the mechanical details of construction, the various types of aircraft instruments which have reached a state of practical development such that they have found extensive use in service. These include instruments for indicating the altitude of aircraft, their speed with reference to the air and to the ground, and the rate at which they climb, instruments such as compasses and turn indicators for showing the direction in which the airplane is flying, instruments used to show how fast the propeller is rotating, and various thermometers, pressure gages, gasoline gages, and flow meters used in connection with the control of the engine, also navigating instruments such as maps and charts to aid in long distance flying and astronomical instruments with which the position of the airplane can be calculated from observations of the sun or stars. In addition a variety of special instruments and accessories are considered, such as instruments for regulating the supply of artificial oxygen provided for high altitude flights, a group of instruments for recording the various factors involved in testing the performance of aircraft such as altitude, speed, rate of revolution of the propeller, temperature and pressure of the atmosphere. The paper is profusely illustrated with photographs of the latest types of aeronautic instruments.

Copies of this paper, which is Technological Paper No. 237 of the Bureau of Standards, can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is twenty cents.

New Women's Altitude Record

Mrs. Bertha Horchem, professional aviator of Ransom, Kan., established on July 5 a new altitude record for women by ascending 16,300 ft. at St. Louis Aviation Field.

The previous record was 15,700 ft. and was made by Andree Peyre, French woman flier, in California last May.

Free Balloon Hazards in Flying over Water

Safety Measures Recommended for Lessening Risk

By "SPINDRIFT"

The writer of this paper is a lieutenant in the Naval Reserve, Aviation, who has resumed his civil engineering practice. He is a practical airman of wide experience, dating back nearly a decade before the War, and holding several brevets, American and foreign. As a sportsman he has participated in many balloon races, and he is well known in the Services and in aeronautic circles for his work on the present subject.

The value of his observations, gathered in the course of an intimate acquaintance with all types of lighter-than-air craft, will be apparent to all balloonists.—EDITOR.

Aircraft and flying hazards have been investigated and classified quite fully and authoritatively, causes have been analyzed, remedies for the more obviously preventable accidents have been indicated; and pilots and their instructors to an extent, and constructors more particularly, have profited by these studies and conclusions. Because of its familiarity to those concerned with aircraft, the general subject need not be rehearsed here, further than to lay the premise that very much remains to be done, much that is essential, to make the use of aircraft reasonably safe for either civil or military purposes. The object of the present paper is to indicate certain lines of solution for one or two groups of flying hazard existing in the operation of free baloons over water.

A distinguishing peculiarity of aircraft, is their ability to continue a journey without break, over land or water. In many cases of the employment of aircraft, their full utility or efficiency, in direct-line flight, or in reconnaissances, can be secured only by this quasi-amphibious quality. It is up to the arts of construction and of maneuver, to fit the craft for this alternative use. At the least, any aircraft, designed specifically for taking off from and alighting on land only, or water only, should, when over the other surface, be able to effect a safe forced landing, to summon and await assistance, and to save its passengers and crew.

The problem has two general aspects—to let the craft down, or at least its occupants, with a minimum of injury in case of an impending crash, falling in waste places or far from shore. The means to meet this problem will be discussed in some detail, but in passing we desire to point out the increasing need to guard against the water hazard. The distressing loss in this year's National Balloon Race, of Lieutenants Roth and Null again emphasizes the danger. And the facts that civil aircraft stand the best chance of justifying their economic use when in competition with the slower surface transportation routes (namely: by sea); and that the problem of defense or attack in war is increasingly a matter of employment of aircraft in connection with coastal operations and with ships,—these facts point the urgency of satisfactorily resolving, or minimizing the water dangers.

Airplanes now have an extreme endurance aloft sufficient for the narrower oceans. But to carry a useful or economic load, the stages must be shorter, or resort had to the new method of relaying fuel in flight. In examining the problem of a trans-Atlantic flight,* and the advisable routes, the writer first proposed the use of intermediate floating landing bases for refueling, as an alternative method. This proposition has been most fully developed recently by E. R. Armstrong.† And the aircraft carrier and landing deck question is a very live issue in the navies of the five Powers, parties to the Naval Limitation treaty.

Airships, it is known, built in accordance with the existing art, could cruise at express speed for a distance half around the earth (the greatest useful distance business men can travel in a non-stop journey) without refuelling. Zeppelins, rather than Leviathans and Aquitanias, present themselves as the premier class high-speed liners between the continents, within the next decade: that is, if they are made reasonably safe over water.

It is pertinent to refer to a number of founderings of lighter-than-air craft in the past, for the lessons that their experiences may convey. We shall deal first with free balloons, because when once adrift in an off shore breeze, they lack the means of return. Kite balloons and airships will be dealt with in a subsequent article.

Blanchard, a contemporary of the Montgolfiers, lost his life in the English Channel. John Wise, that great American balloonist of the '50's, who had already established a 900-mile distance record, disappeared on his last flight when over Lake Ontario. John Wise had the same experience that befell Forbes Post, and the Upson-Andrus team in our day, of having a balloon burst over his head. But Wise did that job deliberately, to demonstrate his confidence that the empty bag would cup upward into the net and come down like a parachute.

Several balloonists have been lost in the North Sea, some of them participants in races. For this reason, several of the races have been won by those who ventured to cross those waters, leaving their rivals safely at the coast.

Andrée, who endeavored to drift across the North Pole, and who had the most complete equipment with which a balloon has yet been provided, probably met his death in the sea, possibly on an ice field.

Crossing the Great Lakes

Passing down to recent years, we come to the first balloon races after the War. Two races were held that year, both from St. Louis: one between Army and Navy, three crews on each side on Sept. 26-27, 1919, and the other for the National Elimination, on Oct. 1-2, 1919. As the Army and Navy had no balloons of racing size (2000 cu. m. or nominally 80,000 cu. ft. displacement), six 50,000 cu. ft. varnished cotton balloons that had been used for war training purposes, were supplied by the Missouri Aeronautic Reserve. In the first of these races, a rule was made that any pilot, descending in the water, would not be disqualified, but would be credited with distance up to the last shore crossing, being penalized only for the uncertain distance made over water, and by the wetting. Two crews essayed to cross the Lakes. Captain Phillips and Lieutenant Burt, U. S. A.—who won the race—were precipitated into the waters of Porte de la Mort, at the entrance to Green Bay, but they were rescued by a fishing tug. Lieutenant Burt's account is thrilling reading. There was a strong wind, and half the time he was submerged, clinging to the rigging. A Navy balloon started across Lake Michigan just before dawn, at 4,000 ft., with six bags of ballast left. They negotiated the 90 miles in just over two hours, and suffered no worse than a rough landing in a 45-mile wind after trail-roping more than a hundred miles over a Michigan forest. They had a dry landing; while the Army, who took to the water, beat them by 5 miles in 500.

A few days later, in the National Race, several pilots, nothing daunted by Phillips' and Burt's experience, attempted the Lakes. Ralph Upson got away with it, as usual, and won the race. Even Warren Rasor, that irrepressible Ohio sportsman, who invariably seems to have an undue share of ill luck, negotiated Lake Michigan, Lake Huron, and the dreaded Georgian Bay, and landed with several bags of ballast rather then plunge on into the Canadian woods far from a railroad. He won fourth place, with a 50,000 ft. balloon, competing against 80,000 footers. Poor Custer and his aide, reserve officers and gallant men, fared otherwise. They were brought

* [illegible]lm of Aero Club of America, May 1912

† [illegible]TION June 4, 1923

down in the waters of Saginaw Bay, and it was several days before their bodies were found.

Now this year, we have a repetition of that tragedy in the similar disaster to Lieutenants Roth and Null. From the news dispatches and official reports it appears they either determined to risk re-crossing Lake Erie, after being safely over Canada, in order to gain distance, or that they were carried out unawares, by a sudden storm. That gas still remained in the balloon, with possible flotation, when found, is a sad aspect.

Some Novel Tests

The incidents in 1919, first of Phillips and Burt, who lived to recount their experiences, then of Custer and his aide, who didn't, brought home to the writer the inadequacy of our preparations against water hazards. For it has long been established that about nine-tenths of the death roll in ballooning is, paradoxically, due to drowning. The writer was still in active service as test pilot, and secured permission to make some experiments looking to the handling of lighter-than-aircraft over water, when out of control. He proposed a series of tests, beginning with free spherical balloons, equipped with trailing and other auxiliary devices, proceeding to kite-balloons (assumed to be "broken away" from their towing war vessels), and finishing with airships, whose engines were stopped. He had already made a number of tests in the same direction during the early part of the war, before being sent overseas, but planned now to make the series of tests quite systematic, advancing from the elementary and easy, to the more complex and constructive phases of the problem.

We started out with a 1000 cu. m. hydrogen inflated balloon, and a 100 meter trail rope. The lift of the balloon was so great that we decided to take along five young officers for first balloon instruction. The Airship Officer of the Naval Air Station (Cape May), Lieut. Charles G. Little, who perished with the R38, went on the test in command. There was a 30 mile wind, which made an interesting get-away—just missing a high power-house stack. Once over Delaware Bay, we came down from about 1,000 ft. and let out the drag rope. This touched the water, lifted once, then settled back. It was not of cocoanut fiber, so it did not float, thus increasing the drag on the balloon. Our intention was to trail all the way across the Bay, some 40 miles wide on that course, noting temperatures, successive slow vertical oscillations, ballast expended, and amount of retardation due to wind. This worked out very well for the first dozen miles. We would rise, then sink, then rise again within a few feet of our former height, then sink lower on the next downward movement. We came down within 10 ft. of the water. At this time, because of the crowded condition of the small basket, I was sitting in the load ring, where I could see and direct operations. I had one lad handy with a bag of ballast at the basket's edge.

These details are being given in view of what followed, for whatever benefit they may be to those balloonists who may similarly suffer a water mishap.

A Personal Experience

I had had an experience in 1917, just touching water with a balloon basket, and seemingly bouncing off. On that occasion I had immediately after thrown ballast, so as not to touch again. On Delaware Bay, as we came down, quite gently, I thought that if, on the first touch, we did not rebound, the instant release of a bag would send it up.

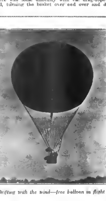
Apparently I reckoned ill with the wind. We just touched a wave. "Bag over" was ordered. But before executed, we were inundated. I say "we," but for the moment, perched in the load ring, I was dry, the others waist deep in water. Jumping down, I dived under in the crowded basket, ordering what men could gain a foothold there aloft in the load ring. I located every bag of ballast left, over a dozen, or some 400 lb., and heaved them over, in the hope that we might clear. No success. As the men stood with their feet on the ring, and their hands clutching the suspending ropes leading up to the balloon (now bowed almost to touching the water), the ring would whirl around, putting the heaviest side under water. Some of the men began quietly to undress. Five miles distant were some fishing smacks.

There seemed three alternatives:

1. Stick where we were, and trust to a chance rescue.
2. Cut the basket loose, and everyone take to the rigging.
3. Cut the basket loose, dividing the crew (since the basket with its kapok would not long float more than two or three men).

Although we had lost some gas in the buffeting, I recommended the second alternative, as we would have lightened ship by nearly 500 lb., and, unretarded by the sea-anchor effect of the basket, should clear. But Lieutenant Little, showing the stuff that was in him, weighed the alternatives otherwise. He decided to risk as few men as possible, but to take small chance on the rest. Because of my experience, he ordered me to take the balloon; he made a quick check of the men, married or single, good swimmers or no, and himself elected, with a seasoned chief petty officer, to remain afloat in the basket, for a hoped-for eventual rescue.

In a shorter time than it takes to read, the basket was cut loose; there was some difficulty with the drag-rope in the high wind, turning the basket over end over and dumping



Drifting with the wind—free balloon in flight

the two men. Five of us, soaked, our feet on the load ring, our hands grasping the rigging above, were suddenly shot aloft. We had, perhaps, 25 miles to go, to reach shore. My problem was: First, to land four inexperienced men safely, without ballast, without instruments, and in a stiff wind without the usual protection of a basket; second, to organize a relief expedition for the unfortunates afloat (for how long?) in the chill waters of the Bay.

I saw we were much light. We could easily have lifted one of those two men—I believed both, but I had been overruled, and of course, strictly obeyed orders. I valved—cautiously, then firmly, then again, carefully. The wet palm of my hand, turned up or down, and my ear-drums, supplied our only

statoscope. We passed through two banks of clouds. The bird's eye view of the Bay and distant shore, was our only altimeter. When once we started down, I knew there was no ballast to retard our acceleration.

We shot up about 6,000 ft. before valving stopped the ascent. The air was chill, and the boys, whom I had grouped standing around the load ring, and leaning outward with their backs against the suspending (or so-called "foot") ropes, were shivering, some minus shoes, and in their underwear. Considering first their safety, the best plan was to bring the balloon down in the water, a few hundred yards before reaching the beach. The men would not then suffer a hard impact from even the greatest vertical descent aerodynamically possible under the conditions, nor would they suffer the broken bones and other injuries sometimes incident to being precipitated on a rough terrain in a 25- or 30-mile wind and without protection for the body.

This maneuver was vetoed because none would admit an ability to swim over 50 yards—some not at all, and of course, I could not guarantee the depth of the water nor my accuracy in coming down at a precise distance from the shore with no landing ballast.

The alternatives remained of landing in an open space, field or marsh, or coming down in wooded country. With the wind, the former was the more dangerous, particularly with the likelihood of some man being knocked off or jumping free at the first touch of ground, leaving the others, perhaps, to be entangled in the rigging and carried up again. Trees, on the contrary, always furnish a soft cushion on which to wreck a balloon. Even that landing was not without incident, as two or three of the men were brushed off as we swished through the tree tops, despite which I was able to land and rip the balloon in a small clearing by a railroad siding. The trip was completed by organizing a rescue party in a motor boat, which zigzagged, and found the two remaining afloat on the kapok rim of the basket. They had been perched there, half in water, for 5½ hr., part of the time singing to keep up their courage.

Some Practical Lessons

For the benefit of balloonists some lessons from this fortunate escape may be summarized as follows:

1. Do not allow a balloon basket to touch—even to "kiss"—the water.
2. Keep your trail rope until all ballast is exhausted. It is the most flexible ballast you can have.
3. Preferably use a floating trail rope: cocoanut fiber. The latter when frayed will leave the hands fuzzy with spicules.
4. For all flights except short pleasure trips or training trips well inland, carry a life-preserver for each member, preferably of the Boddy or head-supporting type. Remember, however, that Kapok, after several hours immersion, becomes soggy and loses flotation. The life-preserver should preferably be of stout, rubberized fabric, well cemented and taped at the seams, to exclude penetration of water.
5. In addition, as regular equipment of all baskets, flotation devices should be attached. The materials are: cork, Kapok in rubberized cushions, air chambers or sausages, and metal tanks.

Balsa wood is also available, lighter than cork, but it must be protected from wet.

Probably the best location of this flotation is in a ring at or near the top of the basket. The flotation should be calculated for the maximum passenger capacity of the basket. Such flotation should be compulsory under F.A.I. and Air Commission Regulations.

6. Exhaust all ballast, rather than descend into water, because once in, you will never get out with the basket.
7. Wind at all favoring, it is possible to attach some ballast to the load ring, to climb on it and cut the basket loose. Travel in the load ring is reasonably endurable, for many hours, and landings in rough country and brisk winds not overly dangerous. But keep the drag rope.
8. Ultimately, if the balloon descends into water, the bag itself should afford flotation for very long periods.
9. It is a mistake to abandon clothes, unless there is a specific, and near objective, to which to swim.
10. If possible, in the waves, stand up on the edge of the basket, rather than be in the water. Sea deaths are as often from exposure, as from drowning.
11. In races, carry sending radio.
12. Carry emergency rations at all times on your body. Try to keep with you a vacuum bottle of hot coffee. Malted milk mixed therewith is excellent.
13. Very pistols, or the like marine signal, should be obligatory.
14. A fairly large, bright-colored flag—probably a selected letter of the International Code—should be carried, with a long staff. It is very difficult for a boat, or for a plane, to see a submerged balloon basket and occupants.
15. Carrier pigeons should be obligatory in all races. At the last, they are good eating.
16. Balloons in a race rarely remain aloft much over 24 hr. 36 to 48 is exception. These durations are well within the capabilities of small airships. One or two such, from the Services, should be detailed to accompany every race, refuelling and gassing at the start, and acting as escort for the convoy of balloons.
17. Do not be afraid to come down from a great height without ballast. Your balloon will parachute every time.

Many of these observations or suggestions are applicable, *mutandis mutandis*, to other types of aircraft, out of control over water.

In the 1920 National Balloon Race, from Birmingham, the Navy, deciding to profit from experience, provided very complete equipment. Much merriment was caused by the arrival of a wherry from one of the Navy Yards, to be carried along in case the drift was toward the Bahamas or Antilles. The wind being from the SSE, the wherry was left ashore; but had it been taken, the passage of Lake Erie might have been essayed, and a better place won. The Navy balloon, whose basket had been cut adrift the second night, to permit conservation of ballast, reached the shore of Lake Erie beneath an overtaking storm. Only some 25,000 cu. ft. of gas remained in the envelope. A quick calculation showed:

1. Reduction in lift due to lower temperature passing over water, and under cloud.
2. Additional dead weight due to rain soaking of bag and rigging, when once we were in the storm.
3. A wind direction which would take the balloon not across, but the 200 mile length of Lake Erie.
4. Insufficient ballast for either 1, 2 or 3.

Decision: rip-landing.

Upson, who was 50 miles east of the Navy balloon, but only 30 miles farther radially from Birmingham, made the same calculations, and landed third.

In the 1923 Race, besides the ill-fated A-6698, Honeywell, veteran builder of varnished cambric balloons, and a weather-wise pilot of proven ability, had a close call making the New York coast, after being blown back across Lake Erie from Ontario Province. He was the last man to see the lost Navy crew, in a stratum far below.

I have dwelt in detail on the subject of free balloon hazard over water, because it is opportune to our latest loss. That loss must not be in vain, but should spur those who survive to devise the means that such sacrifice shall be spared in future.

Accelerations of an SE5A in Flight

N.A.C.A. Report No. 163

This investigation, by F. H. Norton and T. Carroll, was carried out by the Langley Field Laboratory of the National Advisory Committee for Aeronautics for the purpose of measuring the accelerations along the three principal axis of an airplane while it was maneuvering. The airplane selected for this purpose was the fairly maneuverable SE5A and the instruments used were the N.A.C.A. three component accelerometer and the N.A.C.A. recording airspeed meter. The results showed that the normal accelerations did not exceed 4.00 g. while the lateral and longitudinal accelerations did not exceed 0.60 g.

A copy of Report No. 163 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Simple Chart for Choosing a Wing Surface

By A. A. MERRILL

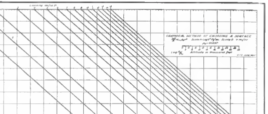


Chart for choosing a given wing surface by means of a graphical method

The equation which forms the basis of this chart is the well known one for horizontal flight, namely $W/A = L_c \rho V^2$ where W/A is the load in pounds per square foot, L_c is the lift coefficient, ρ is the density of air in lb./cu. ft /g = 0 00237 at sea level and V is the speed in feet per second. As we are dealing with the second power of V by using logarithmic scales, we get straight lines which makes the chart easy to draw accurately.

We chose as a maximum ordinate or L_c of 0 1 because to go lower generally means flying too close to the angle of no lift, a dangerous thing for all but the most expert pilots. The minimum abscissa is about 19 m.p.h. which makes the chart available for soaring motorless flight. The maximum speed of 175 m.p.h. covers all but the exceptional machine.

We use the chart as follows. If a maximum speed at sea level of say 100 m.p.h. is desired, this can be obtained with any surface provided the loading is right, which it will be seen is not less than 5 lb./sq. ft. but of course we also want as low a landing speed as possible. Starting with U S A No 1, we find that for high speed we can fly at -1 which is 2 deg. above the angle of no lift, and consequently safe. The highest safe angle for this surface is 14 deg (burble point 16) and L_c at 14 deg. is 0 567. The chart shows that this will give a minimum V of 42 m.p.h. The range then for this surface is 15 deg. and 58 m.p.h. Let us now try U S A. No. 27. Here the minimum angle is -2½ deg., no lift comes at -4½ deg., maximum safe angle is 14 deg. and L_c at 14 deg. is 0 675. This gives a landing speed of about 37½ m.p.h. The range then is 16½ deg. and 62½ m.p.h.

This method of choosing a surface is of course the first approximation since it is based solely upon L_c. After we have eliminated the manifestly unsuitable we have to test for L_c/D_c.

The scale in the upper right hand corner gives the change in necessary horizontal speed for different altitudes. An airplane flying at 100 m.p.h. at sea level will of course have to fly faster at high altitudes. To find the new speed, take the distance on the altitude scale corresponding to the given altitude with a pair of dividers and add it to the speed at sea level as shown on scale B, the new speed can be directly read from scale B. The value of ρ for standard atmosphere for different altitudes is taken from U.S.A. Technical Report No 99.

The Brennan Helicopter

According to the *London Daily News*, the helicopter constructed by Louis Brennan in a recent test hovered for nearly a quarter of an hour at a height of 20 ft., remaining at all times perfectly under control. The machine is said to have carried passengers and a military load of 1000 lb. The test was made in the large airship shed at South Farnborough, where the helicopter was assembled. The utmost secrecy surrounded the work, an armed guard being stationed night and day for months in front of the shed.

Mr. Brennan, who is barred by the British government from participating in the helicopter competition organized by the Air Ministry, for which prizes of £50,000 are offered, will, it is said now devote himself to the question of horizontal and vertical flight. From newspaper accounts it appears that the Brennan helicopter has yet to make a flight in free air, where atmospheric conditions are not as undisturbed as in a closed airship shed.

Showing the Flag

According to *L'Aero-Sports*, of Paris, the Russian air force will officially be represented at the International Aero Show in Gothenburg, Sweden, by two land plane squadrons from Moscow and one seaplane squadron from Cronstadt. This is the first known instance of the Russian air force "showing the flag"—which is incidentally a red star—in a foreign country.

Other countries that will send military air squadrons to Gothenburg include France, Great Britain, Italy and most of the Scandinavian and Baltic countries.

The Employment of Helium in Airships

By COL. A. CROCCO
Royal Italian Air Service

The question of helium may be enunciated today as follows:

The estimated aggregate output of the American sources of helium is 30,000 cu. m. per day of which approximately one third readily could be collected at an initial outlay for the plant of about $70,000,000 Amortizing this capital outlay during the average life of the sources, estimated at 20 yr., and adding the actual running expenses, we find that the minimum cost of compressed helium amounts to about $2 00 per cubic meter. This figure is foreseen in view of a probable yearly production of three million cubic meters of helium.

Aside from military uses, the requirements of which are not hampered by economical considerations, let us examine whether it is profitably convenient for commercial purposes to substitute helium for hydrogen, the price of which is fifteen times less than the above price quoted for helium, and which is obtainable in practically unlimited quantities. We shall evaluate therefore the annual consumption of an airship and consequently also the total tonnage of airships which may be run with the limited quantities of helium available in the United States.

The consumption of hydrogen gas in an airship is due: (a) to osmotic diffusion, (b) to the necessary washings for maintaining a determined purity, (c) to consumption during navigation. In the present state of technique and practical application, the most important of the above three causes is the third, which, in the case of a regular commercial traffic, would assume very high values indeed.

Consumption During Navigation

An airship which is not fully inflated and which remains invariably in thermic equilibrium with the surrounding air, maintains its lifting force unchanged at all altitudes, and therefore during flight its weight decreases in the same measure as the weight of the consumed fuel.

Theoretically, during flight, the airship must lose a quantity of hydrogen gas corresponding to the above decrease in weight, that is, in round figures, one cubic meter of gas for every kilogram of fuel consumed.

Practically, the intervening of other foreseen and unforeseen factors modifies the simplicity of this law, viz disturbances of equilibrium on starting, variations of temperature between air and gas due to variations of the sun rays, deposits of rain and snow on the envelope, dynamic sustentation, disturbances of equilibrium on landing, and to the extent that a skilful pilot by choosing suitable moments and maneuvers and exploiting the meteorological conditions, is able to make exceptional flights without the slightest loss of hydrogen. But this individual skill in no way affects the general importance of the above mentioned law, and particularly where the question concerns a regular commercial service for which a time table, the route, and the navigating altitude have been pre-determined around an average value.

Now, if the consumption is calculated for long distance flights and heavy yearly traffic (for instance 4000 hr.), taking as a base the law of the cubic meter per kilogram of consumed fuel, we find that the yearly consumption of an airship of medium volume, say about 100,000 cu. m. driven by approximately 3600 hp. and navigating at half power with an average hourly consumption of 500 kg., is 2,000,000 cu. m. of hydrogen gas, that is, *twenty* times its own volume. Consequently, practically the entire American output of helium would be required for supplying a single airship and therefore the cost would be prohibitive. On the other hand, even employing hydrogen, this consumption would be excessive, and moreover a practical radius of action in airships can never be attained unless the problem of the replacement of gas is eliminated by means of an integral compensation for the fuel consumption during navigation.

Fortunately, this compensation has been realized in principle in almost all cases occurring in actual practice. Consequently, the most important of the three causes which make the resupply of gas of an airship a serious question, must be considered as possible of total elimination.

There still remains, however, the two other causes which we shall proceed to examine.

Osmotic Diffusion

Although it has not been possible as yet to ascertain sufficient data regarding the osmotic loss of helium through the different types of aeronautical fabrics, the experiments made up to date have demonstrated that, for the same rubberized strata, the diffusion of helium is a little more than *one half* that of hydrogen gas. Experiments carried out by Dr Gallo at the Institute of Experimental Aeronautics, Rome, on Italian rubberized fabrics containing a weight p of rubber of from 80 to 160 gram per square meter of fabric, demonstrated that the average loss, at ordinary temperature, was approximately $\frac{520}{p}$ liters in 24 hr., while the same experiments carried out with hydrogen showed an average loss of $\frac{1000}{p}$ liters in 24 hr.

Previous experiments carried out in the United States with hydrogen gas do not appear to confirm the law of the inverse proportionality to the weight p and, furthermore, reveal a high factor of temperature. On the other hand, they demonstrate the possibility of very much smaller losses, even in the case of high temperature, by using special types of rubberized fabric. Therefore, it is not unreasonable to assume for the present a loss of three liters per square meter of cloth in 24 hr., in view of the probable type of fabric which would be employed for an airship of the capacity mentioned above, and also under the hypothesis that, as necessity arises, the technique of rubberized fabric will be improved to a very great extent.

Basing our calculations on this figure, the above mentioned airship, the surface of diffusion of which is 18,000 sq. m., would lose through osmosis 19,440 cu. m. of gas per year, which is less than 20 per cent of its value. The relative losses in the case of greater volumes than the above would be even smaller, due not only to the smaller ratio between surface and volume, but also to the greater unit weight of the rubberized solution.

Replacement on Account of Washings

At present the fresh supplies of hydrogen required on account of consumption during navigation, are sufficient to maintain the necessary purity inside the envelope, but where fresh supplies are not available, the washing of the gas becomes a daily necessity the importance of which is much greater than the actual losses through osmosis. In fact, about 400 liters of air enter the envelope to every cubic meter of helium diffused through osmosis. If it is desired to maintain a constant degree of purity within the envelope, this air must be eliminated by the washing process. If x be the above mentioned average degree of purity, and ω the per cent osmotic loss in a unit of time, it will be necessary to substitute in a unit of time for the per cent volume of impure helium equal to $\frac{0.4\,\omega}{1-x}$, the same quantity of pure helium, in order to eliminate the corresponding quantity of air, $0.4\,\omega$.

Thus, for instance, if it is desired to maintain a degree of purity $x = 96$ per cent with an annual osmotic loss of 20 per cent, as calculated above, an annual washing equal to double the volume of the airship is necessary. Fortunately, also this cause of great consumption may be totally eliminated

by regenerating or repurifying the helium, that is, extracting the air which vitiates it, by cooling and liquefying the gas.

Helium purifying plants mounted on railroad cars are already in service in the United States. But for the purpose of civil navigation, fixed plants of limited hourly potentiality and with a double reservoir for the replacement would be sufficient. In this case the washing is made periodically with the helium already purified, while during the intervals the impure helium extracted from the airship is purified.

Concluding, of the three causes examined above which render the replacement of helium necessary—consumption during navigation, washing, and osmotic loss—which are in proportion of 100 : 10 : 1, only the osmotic loss, which amounts to an annual average of 20 per cent of the volume of supply, cannot be eliminated.

This has two fundamental consequences. First, the necessity of the replacement being reduced to this one single cause, the available quantity of American helium is sufficient for running, not merely one, but 150 airships of the average volume mentioned above, that is, an aggregate tonnage of 15,0000,000 cu. m., which is sufficient for a world fleet of civil airships. Second, the cost of helium comes within the reach of economical navigation, because apart from the volume of gas necessary for inflation, only an annual replacement of a maximum of 20 per cent of the above volume is required. In other words, the initial gas volume necessary for inflating the dirigible is exhausted in a minimum period of five years.

Consequently, considered in this light, helium is no longer a material of consumption but a material of construction of which the required initial outlay for the plant is amortizable in five years, therefore, its substitution for hydrogen in civil enterprise is possible and economically profitable.

Longitudinal Dynamic Stability

N.A.C.A. Report No. 170

This investigation by F. H. Norton was carried out by the Aerodynamic Staff of the National Advisory Committee for Aeronautics for the purpose of studying experimentally the longitudinal dynamic stability of airplanes in flight. The airplanes selected for this purpose were a standard rigged VE7 advanced training airplane and a JN4h with special tail surfaces. The airplanes were caused to oscillate by means of the elevator, then the longitudinal control was either locked or kept free while the oscillation died out. The magnitude of the oscillation was recorded either by a kymograph or an airspeed meter. The results show that the engine speed has as much effect on the period and damping as the airspeed, and that, contrary to theory as developed for small oscillations, the damping decreased at the higher airspeeds with closed throttle.

A copy of Report No. 170 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Aeronautical Patents

Granted June 19, 1923

1,458,957 Course Drafter for Marine and Aeronautic Vessels. Richard Hermann Schachammer, Karlsruhe, Germany.

1,459,075 Fuse for Artillery and Aviation Projectiles. Leon Emile Remondy, Rueil, France.

1,459,268 Dirigible Headlight. Cecil Charles Smith, Sydney, New South Wales, Australia.

Rules of the Gordon-Bennett Cup for 1923

As the Aéro Club de Belgique is the holder of the Gordon-Bennett Aeronautic Cup for the year 1922, the latter will be offered for competition at Brussels, on Sept. 23, 1923, under the following conditions:

The cup will be contested for under the general regulations of the F.A.I., as well as subject to the special regulations relative thereto adopted by the office of the F.A.I. on Jan. 3, 1923.

The following regulations, framed by the Contest Committee of the Aéro Club de Belgique, shall also apply:

Art. 1 According to the decision of the Committee of the F.A.I., adopted Jan. 3, 1923, all entries must be in the hands of the Aéro Club de Belgique, 73 Avenue Louise, Brussels, before March 23, 1923.

Art. 2 The inflation of the balloons will take place at Brussels, on the terrains of the Solbosch, at the end of the Avenue des Nations (East side of the Bois de la Cambre).

The start will take place on Sunday, Sept. 23, after 4 p. m.

Art. 3 The following prizes and cups will be awarded to the victors:

1st Prize: (a) Annual award for the year 1923 of the Gordon Bennett Cup; (b) Presentation of the gold watch offered by H. M. the King; (c) Presentation of the Silver Cup offered by the Aéro Club de Belgique; (d) Half of the total non-reimbursable entry dues and of the forfeits.

2nd Prize: (a) Large silver medal of Aéro Club de Belgique; (b) A third of the non-reimbursable entry dues and of the forfeits.

3rd Prize: (a) Silver medal of the Aéro Club de Belgique; (b) Balance of the non-reimbursable entry dues and of the forfeits.

Medals and Special Prizes: The contestants (pilots and assistant pilots) will receive the souvenir medal to be struck on the occasion of the contest; other additional prizes may be created at a later date.

Art. 4 In addition to the ascension material, properly so called, each contestant should be supplied with the following:

(a) 25 meters of inflating tube of 300 mm. in diameter;
(b) 100 bags of inflating ballast;
(c) An inflating ground cloth;
(d) A barograph for the purpose of controlling the ascension; the apparatus is to be sealed with the help of the Contest Committee.

Art. 5 The material must be sent prepaid to Brussels, not earlier than the 14th and not later than the 18th of September, to the following address: Aéro Club de Belgique — Care Tour-et-Taxis, Brussels. The packages must show in a clear and distinct manner the name of the proprietor of the balloon, so that they may be identified upon arrival at the station and be exempted from custom duties.

Art. 6 The 'Aéro Club de Belgique' will undertake to transport at its own expense all contestants who so desire, from the station of Tour-et-Taxis (Brussels) to the depôt of the Solbosch, without however, assuming any risks.

Art. 7 The care and supervision of the material will be assumed at the depôt (sub-station of electricity of the Solbosch) by the 'Aéro Club de Belgique'.

Art. 8 The examination of the cubage of the balloon will be conducted by the Contest Committee of the 'Aéro Club de Belgique', beginning Sept. 19. The contestants or their delegates are invited to assist in this operation.

Art. 9 Working outfits and equipment will be furnished by the Aéro Club de Belgique, both for the transportation of the material from the garage to the site of inflation, as well as for the purpose of effecting the inflation itself, which will be conducted under the responsibility of the pilot or of his delegate.

Art. 10 As the inflation must start on Sept. 22 at 4 p. m. at the latest, the balloons must be in position the same day, at 2 o'clock at the latest, at the location assigned them by the drawing of lots.

Art. 11 The gas (special lighting gas) will be furnished free to the contestants.

Art. 12 The log book and the landing certificate will be furnished by the Aéro Club de Belgique.

Art. 13 According to the decision of the Committee of the F.A.I. (Jan. 3, 1923), the territory of Russia will be neutralized, and landing there will be prohibited and penalized by disqualification.

Art. 14 Each balloon must bear its national flag, as well as the colors of the club it represents.

AIRPORTS AND AIRWAYS

This Department is concerned with all civil flying activities such as the establishment of airports, the marking of airways, warnings to airmen regarding obstructions, experiences gathered on flying routes and landing fields, the work of commercial aviation companies and private fliers, the formation of new air transport enterprises, personal paragraphs of general interest, etc.

Communications to this effect, addressed "Airways Editor, Aviation, 225 Fourth Ave., New York City", should be brief, accurate and to the point. They should deal with facts, not with theories or speculations. While American civil flying activities will naturally be given prominence, communications will also be welcomed from Canada, Mexico and other parts of the Western Hemisphere. EDITOR

How Boston Got a Municipal Airport

With the official landing in an Army plane by Lt. R. C. Moffat, A.S., on June 5, 1923, began the last chapter in the construction of the Boston municipal airport. Two large Army hangars are already completed, two more are under construction, and only the erection of private hangars and the transfer of material remains to be done before the airport will be finished. A brief outline of the large amount of work necessary to obtain the construction of the airport, the difficulties overcome and the co-operation obtained from all sources may be interesting and encouraging to the other communities now without a landing field.

In 1918 the first concerted effort to obtain a landing field in Boston was started and various sites were investigated, particularly one at the Strandway at South Boston, Mass. But for various reasons, principally the opposition of the residents who desired the site for a park, this location was abandoned, and there the matter rested until the summer of 1921 when a special committee of the Aero Club of Massachusetts made a study of the situation. The committee on Post Office and Postal Facilities of the Boston Chamber of Commerce at about the same time and independent of the Aero Club decided to go into the matter thoroughly and obtain for Boston an adequate landing field. They prepared a most excellent report on the entire situation which could very properly serve as a model for similar work in other communities and recommended that the Commissioner of Public Works be authorized to provide state land and the funds necessary to establish a suitable airport. This the late commissioner, John N. Cole, refused to do, whereupon the Chamber of Commerce introduced a bill into the Legislature for the construction of a field. Incidentally this was the first bill that the Chamber had introduced into the Legislature for several years and the fact that the directors of the Chamber of Commerce allowed their sub-committee to take this step shows the broad-mindedness and the aggressiveness of the Boston Chamber.

The introduction of this bill was followed by a bitter fight in the Legislature. Several hearings were held and eventually a favorable report was returned and the bill was passed, providing for the use of state land and appropriating $35,000 for its improvement. It was obvious, however, that $35,000 would not be sufficient to do the job properly and here again the Chamber of Commerce came to the front and by public subscription raised over $13,000 additional from some 600 individuals. During the fight in the Legislature Dr. James T. Williams, Jr., Editor in Chief of the Boston *Transcript* became interested and it was due principally to his personal efforts that the bill was finally passed. In October, 1922, Mayor James M. Curley, of the City of Boston, appointed a Board known officially as the Boston Municipal Air Board to co-operate and assist in every way possible in the completion and operation of the airport. This Board which is headed by Colonel Edward P. Warner has done excellent work in hastening the completion of the airport, and through its influence has been able to obtain much equipment which was not available through state or federal appropriations.

The Boston Chamber of Commerce, at about the same time, felt that aviation in New England was of such importance that it appointed a new committee, headed by Col. Edgar S. Gorrell and known as the Committee on Aviation, which took up the landing field work previously done by the committee on "Post Office and Postal Facilities." Now that the landing field is an assured fact this committee will devote most of its efforts to obtaining landing fields and establishing airways throughout New England.

Airway Map of United States

The first airway map of the United States has just been issued by the Airways Section of the Army Air Service. The map is edited in seven colors on an approximate scale of 1 : 4,000,000, or 100 kilometers (63 miles) to the inch, and shows all the airports and emergency landing fields of which information is available. The different classes of landing facilities are indicated by dots of different colors, as follows:

Wright, Model E4, 200 hp. engine which successfully passed the 300 hr. endurance test of the Navy Department

Government or Army fields, red; Navy and Marine Corps air stations, blue; Air Mail fields, grey; municipal airports, purple; emergency fields, yellow; seaplane landings, brown. All landing facilities, including emergency fields, are indicated by the name of the nearest inhabited place, and red lines connect the principal airports, showing probable routes of aerial transit. Inasmuch as the drafting of this map required the careful listing of more than 3000 landing facilities, the magnitude of the work accomplished by the Airways Section will be appreciated.

Full information on all landing facilities indicated on the Airways Map is contained in Air Service Information Circular No. 404, "Airways and Landing Facilities." It should be noted that this circular of 112 pages contains the unabridged information on landing facilities compiled by the Airways Section, which will make it of considerable value to airmen inasmuch as the "Landing Field and Camp Site Guide" gives the same information in a greatly abridged and often unintelligible form.

Rules of the Air For Balloonists

The first rule against the throwing overboard from aircraft in flight heavy objects likely to cause damage to persons or property is included in the part covering balloons of the American Aeronautical Safety Code, it is announced by the Bureau of Standards. Balloons have to carry ballast, the amounts required varying with the size of the balloon and the conditions of the flight, and according to the code, this ballast must consist of sifted sand or water, and must be poured out, not dumped out in sacks.

Other rules for the safety of passengers in balloons are given in the code. These must be printed on a card attached to the inside of the basket. They are: No smoking; don't stand or sit on the edge of the basket; hold onto drag rope side of basket when landing; bend knees at moment of striking ground; stand on or behind ballast bags; do not get out of basket till pilot gives permission. The last is necessary because if a passenger got out, the balloon, lightened, might go up again and be wrecked in the new landing.

Each balloon is provided with a valve for letting out gas, and it also has a rip panel with which the whole amount of gas can be let out quickly. This panel is required to be of such dimensions that at least one-fifth of the gas will escape the first minute. It should not be ripped until the balloon gets quite close to the ground, the maximum safe distance being fifty for a coal gas balloon and twenty feet for a balloon filled with hydrogen. The rip cord is red so as to avoid having it inadvertently pulled when high in the air. The code also specifies the strength required for the different parts of the balloon and gives rules for their care and inspection.

When a balloon is inflated with inflammable gas, no one near it will be permitted to smoke. During inflation, and even more during deflation, smoking in the vicinity will not be permitted and the wearing of hobnailed shoes, fur coats, exposed buckles, and other articles of clothing likely to cause a spark will be forbidden. When the balloon is being inflated in a shed, precautions must be taken to prevent the spread of fire along the tube through which the gas is fed. Hoppers or bags of sand are placed at intervals along it and are dumped on the tube to stop the supply of gas to the fire.

Inflation in the open should not ordinarily be attempted in wind velocities over 20 m.p.h., and if inflation is necessary under these conditions, special care should be taken against accident. The section of the bag being filled is cut off with sand bags from the rest and the bags moved as the gas flows in. Before inflation it is important to see that the ground cloth or floor is clean, that all valves and openings are properly closed, that internal cords are in order, and that all air possible is out of the envelope and connecting lines. Sand bags must be provided sufficient to hold the balloon down when fully inflated.

Free balloons are required to carry compasses, altimeters, and statoscopes; captive balloons need air speed meters, altimeters, and manometers, and they must also have some means of signalling to the ground. If electric lights or radio equipment are installed, the circuits should be such that sparks are not likely, and all parts where sparks are likely to occur should be well protected. For flights over water, life preservers will be required, and also some means of floating the basket and its equipment. Suitable protection against lightning should be provided.

Instructive Experiments

The readers of AVIATION are familiar with the "lateral pressure equalizer" or "front spar aileron" invented by Grover Loening, the aircraft constructor, with a view to obviating the drawbacks of the orthodox trailing edge aileron. In high speed airplanes the trailing edge ailerons have a tendency to put twisting stresses on the wing, with the result that lateral control is neutralized in such a way as to make the machine stiff on the controls. The front spar aileron overcomes this drawback because the movable surface used to increase lift on one side is placed entirely in front of the center of the wing, so that the effect of this increased pressure, by tending to twist the wing, causes the twisting stress to be reversed in favor of the lateral control instead of against it. As a result, the machine responds to the controls much more smoothly than when it is fitted with the orthodox type of ailerons.

Flying trials carried out in bumpy weather over Port Washington, L. I., have amply demonstrated this fact. The Loening Air Yacht belonging to Harold S. Vanderbilt, was, with his consent, used for these interesting experiments, and it was found that the front spar ailerons gave easy and instantaneous control in every case. Some sharp turns were made for purposes of comparison, and the flying boat responded with the quickness of a two-seater fighter. The machine was also flown for some twenty minutes without the pilot touching the controls, and it displayed a marked degree of inherent stability. A slight touch of the rudder bar would make the ship turn around without its horizontal stability being affected in the least way. The pilot on these trials was H. H. Thorburn, Mr. Vanderbilt's air yacht pilot, and the passengers were Grover Loening, George Rummill, pilot of the New York—Newport Air Service, Inc., and Ladislas d'Orcy, editor of AVIATION.

More recently another experiment was tried and from this some interesting deductions may be drawn. The standard Loening Air Yacht has no dihedral to its wings, and although it is to all intents inherently stable, as the above mentioned flying trials show, Mr. Loening decided he would increase this stability by setting the wings at a 3 deg. dihedral. The results of this change were unexpected. On taking off from the foot of 31st Street, on the East River, where the factory of Loening Aeronautical Engineering Corp. is located, the experimental air yacht was struck by one of the gusts that are a frequent occurrence in that neighborhood, and one wing went up as the result. The pilot pushed the stick the other way, but the controls seemed inoperative, for the ship side slipped into the water from a height of about 30 ft. The occupants were pitched out into the water, and were uninjured save for a cut over the eye suffered by Pilot Rummill, but the boat was rather badly strafed.

It would seem from this experiment that while the front spar ailerons work satisfactorily with straight wings, they fail to do so with a dihedral. The reasons for this peculiar behavior have not yet been elucidated and will be awaited with interest.

Commercial Value of Skywriting

When Vice-President Hill of the American Tobacco Co. said emphatically "We want skywriting" the first skywriting advertising contract in America was rescued from the scrap heap to which it had been consigned by most of the other officials of the tobacco company. Among the many reasons advanced for abandoning the skywriting proposition by its opponents in the company was the lack of appropriation for additional advertising during 1923 beyond that already contracted for by the tobacco company. On this point Mr. Hill was equally emphatic. "We will have to find the money." The money was found and today pilots of the Skywriting Corp. of America have emblazoned the words "Lucky Strike" in the skies over the principal cities from New York to San Francisco. Capt. Cyril Turner is at the present time carrying on the American Tobacco Co.'s contract in Seattle, Wash.

The organization of the Skywriting Corporation since it began operations with two British pilots has been augmented by four additional British pilots and eight American pilots, fourteen in all. Twenty-two mechanics are now regularly employed and four principal bases maintained.

Allan J. Cameron, president of the Skywriting Corp. of America, with headquarters at 50 E. 42 St., New York, is an American who served in the British Army during the war. He came to this country with Maj. J. C. Savage, inventor of skywriting, and Capt. Cyril Turner, his chief pilot. It was Captain Turner who made the initial skywriting flight in America when he wrote "Hello, U S A" over New York last December.

Details of the first skywriting contract with the American Tobacco Co. were given in the Feb. 5 issue of AVIATION. Since that time the foresight of Vice President Hill has been wonderfully justified. Dealers' reports to the tobacco company indicate that the sale of Lucky Strike cigarettes in the localities where the skywriters have worked have increased from 25 to 30 per cent, with more gradual but no less remarkable increases in total volume of sales throughout the United States as the result of tons of newspaper publicity.

U. S. ARMY AND NAVY AIR FORCES

U. S. ARMY AIR SERVICE

Purpose of the Barling Bomber

Two elements have influenced the Army Air Service in investing the enormous expenditures absorbed in the production of an airplane such as the Barling Bomber. These may be classified as the known uses of such an airplane and the uses not yet known, owing to the lack of experience with large airplanes. When a large airplane is spoken of, one of some 200,000 lb., or four times the size of the Barling Bomber, one which might drop two 30,000 lb. bombs, is intimated. It is not improbable that such an airplane may be the logical development of the next ten years, the Barling Bomber being but a step in that direction. Hence the Barling Bomber is to be looked upon as a small big airplane rather than a big small one.

Considering the known uses of the large airplane, there are two great new factors acknowledged for the war of the future, namely, the demoralization of the civilian population and the bombing of warships.

The Zeppelin airship dropped some moderately large bombs on London during the late war, but was helpless against attack by airplanes. The bombing airplanes which were consequently used, dropped but small bombs. The result of a large number of small bombs was the demoralization of a few of the civilian population, but the majority became more defiant than ever. The large bombs filled the people with terror in proportion to the great damage effected at one blow. The dropping of one 30,000 lb. bomb, it is estimated, would tear a huge crater in the earth of approximately 50 ft. in diameter, it would completely wreck all the buildings in the neighborhood, the roofs of few houses within half a mile would remain and the glass and debris would render the movement of a fire department difficult or impossible, in case of fire, which would probably ensue. Such a blow would be bad, but if repeated every night for a week, the effect on the civilian population of the approach of any airplane might reasonably be complete demoralization, with no work done, no munitions, no respect for law or order. In addition there would also be the reactionary weakening of the morale of the man at the front, to whom the danger of home and family would be unreasonably maddening. Thus the larger the airplanes for this purpose the better would be the required results.

In regard to the bombing of warships, the experiments conducted by the Air Service, in July, 1921, supply us with data. A 21000 ton battleship, the Ostfriesland, was used as a target. Airplane bombs of sizes up to and including 1100 lb. were dropped but failed to sink the ship though doing great local damage. Then 2000 lb. bombs were used. The ship sank rapidly. Considering the sinking of the future battleship, the aerial bombs will have to do their work by passing through all decks of the ship, including the protective deck which, on the ship experimented with by General Mitchell, was 3 in. thick, or by blowing in the hull side under water, further down than the thick side armor reaches. The newer, post-war battleships would not be as susceptible to the 2000 lb. bomb as was the Ostfriesland. There are many improvements. The steel used may be better. The protective deck is thicker. They also incorporate the water-tight bulkhead scheme and may not capsize like the Ostfriesland, when one or more compartments are filled. Also new schemes of self-sealing, performing somewhat like the airplane gasoline tanks, are in evidence. It is stated by various authorities that these battleships will successfully resist bombs of 4000 lb., probably not much more. As few of the present day airplanes can carry 4000 lb. bombs the case of the battleship is not hopeless, unless we proceed to build large airplanes immediately. It also follows that as bomb sizes increase the battleship must increase in weight proportionately to effect proper resistance.

Dawn-to-Dusk Flight Attempt

An unsuccessful attempt to cross the continent from the Atlantic to the Pacific between dawn and dusk was made July 9, by Lt. Russell L. Maughan, A.S. According to his schedule, the holder of the world's maximum speed record intended to fly from Mitchel Field, Mineola, N. Y., to Crissy Field, San Francisco, in five hops, the stopping places being as follows: Dayton, Ohio, St. Joseph, Mo., Cheyenne, Wyo., and Salduro, Utah.

After several postponements due to unfavorable weather, Lieutenant Maughan flying the Curtiss pursuit plane started from Mitchel Field on July 9 at 3.56 a. m. (E.S.T.). The start in the early dawn from Mitchel Field was not auspicious, although the atmosphere gave some promise of mistiness and fog.

After breakfasting with about twenty newspaper men and photographers who had remained overnight at the field to witness the hop off, the pilot warmed up his motor and then took off amid the cheers of officers of the Army Air Service, officials of the Aeronautical Chamber of Commerce and a batch of students from the Massachusetts Institute of Technology about 125 spectators in all. He circled the flying field once at an elevation of about 500 ft. and then shot away, shaping a course due West.

Over the Alleghanies Lieutenant Maughan ran into a thick fog which forced him to fly by compass and deviated him to some extent from his route, so that he was far behind his schedule when he landed at McCook Field, Dayton. He nevertheless took off from there, but a clog in the gasoline feed line forced him to abandon the flight when within five minutes from Rosecrans Field, St. Joseph, Mo.

Lieutenant Maughan estimated that he covered approximately 1,330 miles in nine hours. He said he was lost in a fog for 250 miles, and feared he would swerve from his route, but hated to lose any time by slowing down. He made several attempts to go above or around the fog, but it seemed to envelop him completely.

Army Planes Carry Mail

For nine consecutive days, the pilots of the 88th Observation Squadron, stationed at the Fairfield Air Intermediate Depot, Fairfield, Ohio, delivered mail to the 11th Infantry and the 3rd Field Artillery while they were "on the hike" from Ft. Benjamin Harrison, Ind., to Camp Knox, Ky., where they will be stationed for the summer training of the R.O.T.C. and the C.M.T.C. units. Through the efforts of the Air Service it is now possible for the line outfits marching cross-country to enjoy a convenience that they have never before experienced.

Aerial Circus at Scott Field

At least 6000 persons witnessed the aerial circus which was given at Scott Field on Wednesday afternoon, June 20, for the Rotarians who came to the field from the International Convention in session at St. Louis for an outing upon the invitation of the Commanding Officer.

The features of greatest interest to the visitors were the parachute jumps, the burning of a captive balloon and the race by two pony blimps.

Summer Training Camps

A detachment of enlisted men and five airplanes have been ordered from the 88th Observation Squadron, Fairfield Air Intermediate Depot, Fairfield, Ohio, to proceed to Camp Knox, Ky., to participate in the summer training of the R.O.T.C. and the C.M.T.C. Units. The 7th Photo Section will work in cooperation with the Field Artillery, and all photographs taken at Camp Knox will be sent to Fairfield for developing and printing.

Army Orders

Sec. Lieut. Homer W. Ferguson, F. Art. from 1st Field Artillery, to Brooks Field for H/A training.

Sergt. Linwood Hubbard, A. S. Langley Field, to N. Y. National Guard as sergeant-instructor of A. S.

First Lieut. William L. Boyd, A.S., from McCook Field to Langley Field with 2nd Bomb Group (temp duty), to sail from New York for Panama C.Z. about Oct. 4, 1923.

Capt. Clinton W. Howard, A.S., relieved from A. S. Engineering School.

Leave of absence of one month to First Lieut. Lloyd C. Blackburn, A.S., and First Lieut. Grandison Gardner, A.S.

Leave of absence to First Lieut. William H. Carthy, A.S., extended one month.

First Lieut. James F. Powell, A.S., from Org. Res. Portland, Ore., to Scott Field.

Leave of absence of two months to First Lieut. Oakley G. Kelly, A.S.

Leave of absence of one month and ten days to First Lieut. Harold L. Clark, A.S.

Leave of absence of twenty-six days to Sec. Lieuts. Donald W. Norwood and George O. Robertson, A.S., to sail for Hawaii about Aug. 4, 1923.

Leave of absence of one month and fifteen days to First Lieut. Henry E. Woodridge, A.S., to sail for Hawaii about Aug. 24, 1923.

Resignations of Sec. Lieut. John Cyrus Graffin and Sec. Lieut. Ernest Herman Pfeffer, A.S., accepted.

First Lieut. Lewis R. P. Reese, A.S., from Walter Reed Gen. Hospital to Fairfield A.I.D.

Capt. Paul T. Beck, A.S., designated as assistant commandant of A. S. Primary Training School, Brooks Field.

Maj. T. DeW. Milling, A.S., designated as assistant commandant of A. S. Tactical School, Langley Field.

Lieut. Col. Charles H. Danforth, A.S., relieved as commandant of Airship School, Langley Field, designated as commandant of A. S. Tactical School, Langley Field.

Leave of absence of two months to Maj. Jacob H. Rudolph, A.S.

Leave of absence of one month to Capt. Thomas S. Vose, A.S.; to sail for Canal Zone about Oct. 4, 1923.

Leave of absence of four months to Capt. Frederick R. Lafferty, A.S., upon arrival in U.S.A.

Relieved from Kelly Field and assigned to A. S. Primary Flying School for training: Sec. Lieuts. Milton J. Smith, Walter H. DeLange, Walter S. Smith, Glen T. Lampton.

Capt. Victor Parks, Jr., A. S. is transferred to the Chemical Warfare Service, and is relieved from duty at Maxwell Field, Ala.

Maj. Albert L. Sneed, A. S. is relieved as ass't military attache for aviation, Constantinople, Turkey, to return to the United States.

First Lieut. Max. F. Moyer, A. S. is relieved as inspector, Eng. Div. A. S., at the Goodyear Tire & Rubber Co. Akron, Ohio, to assume charge of district air service procurement office that city.

Posthumous Honors

A Medaille Militaire, posthumously awarded to Lieut. Benjamin S. Walcott, of the Lafayette Escadrille, for gallantry in action with the French forces, was recently presented to his father, Dr. Charles D. Walcott, director of the National Museum in Washington, D. C., by Col. Georges Dumont, military attache of the French embassy.

Lieutenant Walcott was born in Washington in 1896. After being educated in the public school he graduated from Western High School and entered Princeton University in 1916. Early in 1917, having decided to enlist on the Allied side, he was granted a leave by the University and he obtained a pilot certificate at the Curtiss flying school at Newport News, Va. After having passed the medical examination of the Lafayette Escadrille, he sailed for France and was sent to the training camp at Avord, going to the front from there on Nov. 1, 1917. On Dec. 12 he shot down a German two-seater biplane $2\frac{1}{2}$ miles within the enemy lines, and when returning he was over taken by four Albatros scouts and shot down in the German lines. The Germans buried him with military honors at Leffincourt, in the Ardennes.

In the latter part of 1919 the American Army officials transferred his remains to the American soldiers' cemetery northwest of Verdun. It is now proposed by French officials to set aside a garden spot for the exclusive interment of the dead members of the Lafayette escadrille, of whom sixty-four have died. This cemetery will be located at Foret de St. Cloud, between St. Cloud and Surennes, near the Fort St. Valerien, toward Malmaison.

Stuart Walcott's commission as first lieutenant in the American Army was awaiting him in Paris on the day that he fell. It has been received and is now on display in the National Museum, along with the Croix de Guerre and several citations received from the French army and his B.S. diploma from Princeton.

Reserve Officers in Flying Training

Saturdays and Sundays have been busy days lately for the members of the Officers' Reserve Corps who reside in San Diego, Calif., and vicinity, as the weather man has been very liberal with fine weather for week ends. Reserve Officers have taken advantage of the excellent flying conditions offered, with the result that approximately thirty officers, under the direction of Maj. T. C. Macaulay, A.S., O.R.C., have participated in aerial flights during the past fifteen days.

U. S. NAVAL AVIATION

Landing Field at Naval Aircraft Factory

The following, taken from the report by Capt. Arthur H. Page, Jr., U.S.M.C., of the flight of three DH4B's from the Marine Field at Quantico to Lakehurst, and return by way of Philadelphia, is of interest in connection with the new landing field at the Naval Aircraft Factory at Philadelphia.

"The field at the Naval Aircraft Factory with the wind from the south-west has an excellent approach and is a very slow field (as there is no grass on it at present) and of ample length. It is a two-way field. The approach from the other direction is over buildings, but even in its present condition there is ample room for a landing. The take-off over the Navy Yard and buildings of the Factory is not good, and it is recommended that unless the wind is very strong a down wind take-off be made. An additional point in this connection is that the ground nearest the factory is much harder than the ground at the end of the creek making it much easier to get up ground speed for a take-off."

Admiral Simpson Leaves Pearl Harbor

Rear Admiral Simpson, recently relieved from the command of the Naval Station, Pearl Harbor, T. H., by Rear Admiral John D. McDonald, was given an ample demonstration of the sincere regard in which he and Mrs. Simpson were held by the officers of the station and the people of Honolulu when they sailed on the U. S. Army transport "President Grant" on June 7. Almost the entire officer personnel of the station, together with many civilian friends were on the dock to bid them goodby. The transport flew the Admiral's flag and was accompanied by a detachment of aircraft and submarines past Diamond Head.

Shed Tests of ZR1

Shed tests on the rigid airship ZR1 under construction by the Navy at Lakehurst, N. J., will shortly start according to a report just received by the Bureau of Aeronautics. A slight delay has been caused by the development of torsional vibration making it necessary to remodel two of the Packard engines to remove this defect.

It is planned to take the ship from the shed about Aug. 15 and start the real flight tests about Aug. 20.

Homing Pigeons for Naval Aviation

The Communication Service has come to the conclusion that homing pigeons are not necessary in communications—that they are, however, useful in the Aviation branch for special service and safety promotion. Communications has recommended that this service be turned over to the Bureau of Aeronautics.

Navy Men Given Parachute Training

Secretary Denby visited McCook Field at Dayton, Ohio, on July 4 in connection with the unveiling of a monument to Spanish American War veterans, and inspected the station and its many activities. He was an interested spectator of parachute jumping by Aviation Chief Riggers J. R. Ingram, L. H. Ford, and Alva F. Starr, U. S. Navy, who are stationed at McCook Field in connection with the development and testing of parachutes for general issue to Naval Aviation units.

A report from McCook Field gives an interesting account of their activities and the methods which are used in connection with parachutes. The report is quoted in part as follows:

"They have been very active in making live jumps during the last two weeks. They have proceeded to Chanute Field by air to make a few practice jumps prior to the exhibition in honor of the Secretary of the Navy. On their return to McCook Field all three, the day before the Secretary's visit, took the air, flying to Wilbur Wright Field which is a little larger than McCook Field, and made a series of live jumps and lift offs.

"During the Secretary's visit they again demonstrated the safety of the service type of parachute by live jumps from DH4B's and Martin Bombers under adverse wind conditions and over a small field. Chief Aviation Rigger Starr was caught in a contrary wind puff, thrown out of the field and landed in the Miami River in four feet of water. He states that while the water is only four feet deep, the mud under the water is at least ten feet deep.

"The General Inspector reports that the main difficulty at present is keeping these men from jumping three times a day as an appetizer for their meals.

"Chief Aviation Rigger Ford will be returned to the Pensacola Air Station upon the completion of his work at this Field, where he should be of great assistance to the personnel of that station in the maintenance, care and use of parachutes. It is the intention of the Bureau after we take over our own testing of parachutes to use Starr and Ingram as a nucleus of a testing crew. These men have been at McCook Field for the past six months, spending their entire time in the Parachute Section, repairing, building and testing all types of parachutes at present known."

From Washington to Minneapolis

Capt. R. A. Presley, U.S.M.C., in a VE9 plane from the Marine Flying Field at Quantico, Va., made a flight to Minneapolis on July 7 in 15 hr. 45 min. The VE9 is a standard training plane for combat pilots and is not designed for excessive speed. The occasion was the opening of the municipal airport at that city. An MO1 from the Naval Air Station, Anacostia, D. C., was present. The MO1 left Washington on July 7, arriving at Minneapolis on July 9, after a stop over at Chicago.

Lieut. G. R. Pond, U.S.N.R.F., piloted the MO1 and was accompanied by George Moffett, sixteen year old son of Rear Admiral W. A. Moffett, Chief of the Bureau of Aeronautics, Navy Department, and Capt. Georges Thenault, French Air Attaché.

Gasoline Substitute Tested

A gasoline substitute composed of 30 per cent denatured anhydrous alcohol and 70 per cent gasoline is being tested at the Naval Air Sations at Anacostia, D. C., Hampton Roads, Va., and Pensacola, Fla. The tests so far have been satisfactory and show that the water temperature in the cooling system of the engine of the plane is ten degrees lower when using this combination than when straight aviation gasoline is used. The mixture develops the same horsepower, but is slightly heavier in weight. Definite conclusions, however, have not yet been arrived at and the tests will be continued at the above named stations for some months.

American Telephoto Lens

Tests are being conducted at the Naval Air Station, Anacostia, D. C. of the Bausch and Lomb telephoto lens to compare it for service use with the Cook Telar lens of British manufacture that has heretofore been used. A telephoto lens is to the camera as a telescope is to the eye.

Orders to Officers

Lt. Jerome A. Lee, detached U.S.S. Chewik to U.S.S. Langley as first lieutenant.

Ens. John P. Womble, orders of May 19 revoked, continue duty U.S.S. Somers.

Lt. Comdr. Newton H. White, detached Naval Intelligence, to aide on staff, Comdr-in-Chief, United States Fleet.

Ens. Rhea S. Taylor, detached Aircraft Squadrons, Battle Fleet, to Naval Air Station, Pearl Harbor, T. H.

Lt. John C. W. Taylor, detached all duty, resignation accepted June 23.

Mach. Benjamin F. Sherman, detached U.S.S. Wright, resignation accepted June 30.

Pay Clk. Lawrence G. Grearson, detached Naval Air Station, Pearl Harbor, T. H., to U.S.S. Oklahoma.

Lt. Emile Chourre, detached U.S.S. Aroostook, to Naval Air Station, Pearl Harbor, T. H.

Lt. Lawrence T. DuBose, detached aide on staff Comdr. Mine Squadron One, Control Force, to Bureau of Aeronautics.

Lt. Robert W. Thomas, detached Naval Hospital, San Diego, Calif., to Naval Air Station, San Diego.

Lt. Victor F. Marinelli, detached U.S.S. Wright, to temp. duty Receiving Ship, Philadelphia.

Lt. (jg) Charles A. Collins, detached U.S.S. Wright, to temp. duty Receiving Ship, Philadelphia.

West Coast Activities

As no major operation will be carried on with the fleet during the summer by the Air Squadrons, Battle Fleet, it has been decided to distribute a portion of the planes of that organization to points along the Pacific Coast and to Hawaii, for a period of six or eight weeks, starting the middle of July, for the purposes of additional and varied service and the improvement of the mobility of the various units. The following distribution will be made.

Six torpedo planes, six fighting planes and six observation planes to the Naval Air Station, Pearl Harbor, T. H. These planes will be carried in auxiliaries to Hawaii. Twelve observation planes to Mare Island, Calif. Twelve fighting planes to Sandy Point, Washington. The last named two units will fly to those points from the Naval Air Station, San Diego, Calif.

Pacific Fleet Air Squadrons

On June 20 all of the Squadrons of the Air Squadrons Battle Fleet engaged in a battle problem, consisting of an aerial attack on North Island, San Diego, Calif., the location of the Naval Air Station.

The attacking force, consisting of Observation Plane squadron One and Fighting Plane Squadron Two, was successful in bombing the station. The defending forces were Fighting Plane Squadron One and Observation Plane Squadron Two. Valuable tactical lessons were learned by the operations.

COMING AERONAUTICAL EVENTS

DOMESTIC

Oct. 1-3	National Airplane Races, St. Louis, Mo.
Late Fall	Curtiss Marine Flying Trophy Race

FOREIGN

July 20-Aug. 12	International Aero Exhibition, Gothenburg, Sweden
Aug. 3-31	Sailplane Meet, Rhoen, Germany
Aug. 5-26	Sailplane Meet, Vauville, near Cherbourg, France
Sept. 23	Gordon Bennett Balloon Race, Brussels, Belgium
Sept. 28	Schneider Maritime Aviation Trophy Race, Cowes, Isle of Wight, England
Dec. 1	Entries close for French Engine competition

Repairing an Engine by Plane

A practical instance of the self reliance of Marine Corps Aviation units operating in tropical outposts is given in a recent report to the Bureau of Aeronautics. A Marine Corps plane down in the wilds of Haiti and unable to take the air was reconditioned and made serviceable by a flight of planes which went to the assistance of the disabled craft, carrying spare parts, tools and mechanics to make the necessary repairs. That the work was speedily accomplished was a testimonial to the standard of efficiency of these units which must be maintained at the highest point to meet the daily emergencies which they are called upon to deal with

The pilot immediately after his landing and an inspection of the plane sent word back to his station by carrier pigeon A DH4 plane with a pilot and mechanic responded But it was found that the engine had to be removed in order that proper repairs might be made The DH returned to the station, leaving the pilot of the disabled JN and the mechanic to guard the plane. Their vigil was relieved the next morning by three DH planes from the station, with mechanics, having left the station at 6.10 a. m. The crew of the "flying machine shop" took the motor out, repaired it and all four planes returned to the station, arriving at 10 35, the job having been done and the planes returned in 4 hr 35 min after the relieving planes had left the station. The job could easily have taken more time to do in the best equipped repair shop

Photographic Laboratory at Anacostia

On July 1 work in the Photographic Laboratory in the building of the Bureau of Aeronautics was discontinued, owing to the order that no enlisted men may remain on duty in the Bureau of Aeronautics

A commodious and up to date photographic laboratory is being constructed at the Naval Air Station at Anacostia with facilities for handling both moving picture work and still photography This laboratory will be ready for use about Sept 1 In the meantime photographic work of an urgent nature is being carried on in the present laboratory at Anacostia Facilities for turning out any large amounts of work are lacking, pending the construction of the new laboratory

Flying Tests of T2 Engine

The Wright T2 engine has been installed in the DT4 seaplane and a series of daily flights are being made from the Naval Air Station, Anacostia, to the Naval Air Station, Hampton Roads and return in order to determine the efficiency of the engine for service use The flights are being made without the engine being overhauled On June 30 63 hr 38 min flying time, without repair, had been made, the first flight being made on June 14.

The plane leaves Anacostia at 9 30 a m. and leaves Hampton Roads on its return flight at 1 30 p m of the same day.

Air Ambulance Renders Assistance

Another instance of medical assistance by air being rendered to outlying and inaccessible spots by naval airplane is furnished in a recent report from the Naval Air Station, Hampton Roads. A radio call from Cape Hatteras recently advised of the serious illness of T J Farrow One of the station seaplanes was at once dispatched with a doctor and Mr Farrow was brought back to the Protestant Hospital in Norfolk Due to quick action and the speedy means of supplying medical attention afforded by airplane, it is said that the patient's life was saved

Navy Airplanes at Canal Zone

Three JNG airplanes, assigned to the Naval Air Station, Coco Solo, C Z, have arrived and are being placed in operation immediately for the purpose of testing the new landing field that has been put in commission at the Air Station, and to determine what, if any, improvements or additions are necessary Considerable engineering difficulty was experienced in making this field due to the swampy and coral formations of the terrain It is hoped that this field will be suitable as a base for land planes operating with the Fleet.

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